INTEGRATED CIRCUITS

DATA SHEET

TEA5582

PLL stereo decoder (BTSC system)

Product specification
File under Integrated Circuits, IC02

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Philips
Semiconductors

PHILIPS

GENERAL DESCRIPTION

The TEA5582, a 20-pin integrated phase-locked loop (PLL) stereo decoder, is designed primarily for low cost stereo decoding in a low- to medium-line TV. The MUX input (pin 1) is a low impedance current input, the gain of the input amplifier is therefore determined by the external resistor R1 (see Fig.5). All characteristics are measured with R1 = 47 kΩ. The de-emphasis of (L, R) and (L-R) can be chosen by means of external capacitors and resistors. The supply voltage range of the device is from 7 V to 16 V.

Features

- Wide supply voltage range
- Automatic mono/stereo switching (pilot presence detector)
- LED driver for stereo indicator
- Smooth mono/stereo control
- Matrix and two amplifiers for left and right output signals
- A source selector to switch between the MUX signal and an external signal
- Mute circuit for 60 dB muting of the output level
- External de-emphasis control of (L, R) and (L – R)
- 6 dB fixed attenuation of (L – R) with respect to (L + R) prior to matrix
- All pins are protected against Electrostatic Discharge (ESD)

QUICK REFERENCE DATA

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage range		V_S	7.0	8.5	16	V
Total current consumption	without LED driver	I_{tot}	–	19	25	mA
Decoder						
Overall gain	mono; R1 = 47 kΩ	$G_o(V_o/V_i)$	4	5.8	7	dB
AF output voltage (RMS value)		$V_{14} = V_{15}$	–	245	–	mV
Total harmonic distortion	V_o = 600 mV	THD	–	0.3	–	%
Output channel unbalance		$\lvert V_{14}/V_{15} \rvert$	–	0.1	–	dB
Channel separation	L = 1; R = 0	α	24	28	–	dB
Source selector						
Suppression of MUX signal	$V_6 \geq 2$ V	α	80	90	–	dB
Suppression of external signal	$V_6 \leq 0.8$ V	α	56	60	–	dB
Output amplifiers						
Gain output amplifier						
MUX signal		G_v	6.7	7.2	7.7	dB
external signal		G_v	–0.5	0	+0.5	dB
AF output voltage (RMS value)		$V_{11} = V_{10}$	460	560	640	mV
Mute suppression	$V_7 \leq 0.8$ V					
MUX signal		α	56	60	–	dB
external signal		α	56	60	–	dB

PACKAGE OUTLINE

20-LEAD DIL; PLASTIC (SOT146); SOT146-1; 1996 November 18.

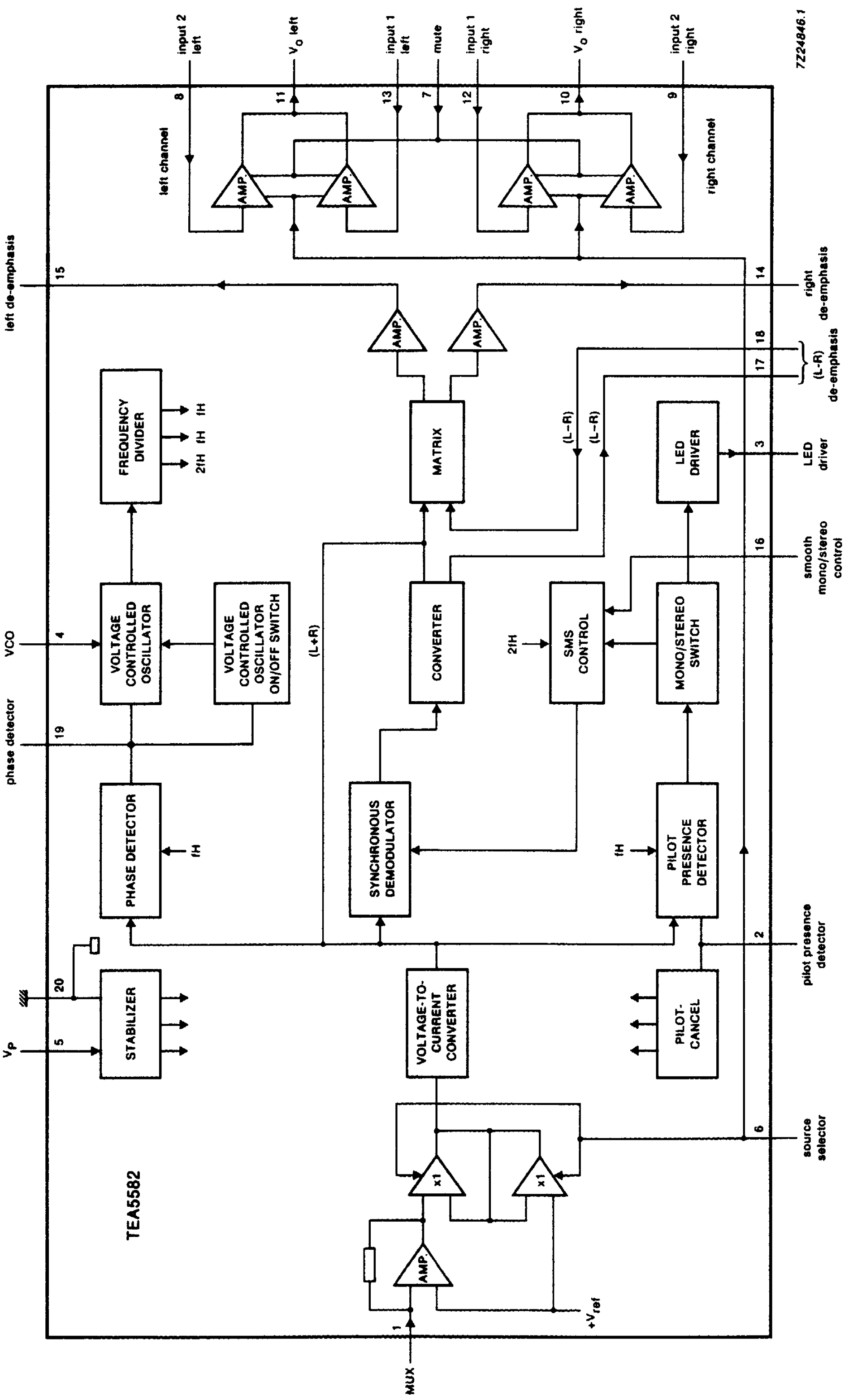


Fig.1 Block diagram.

PINNING

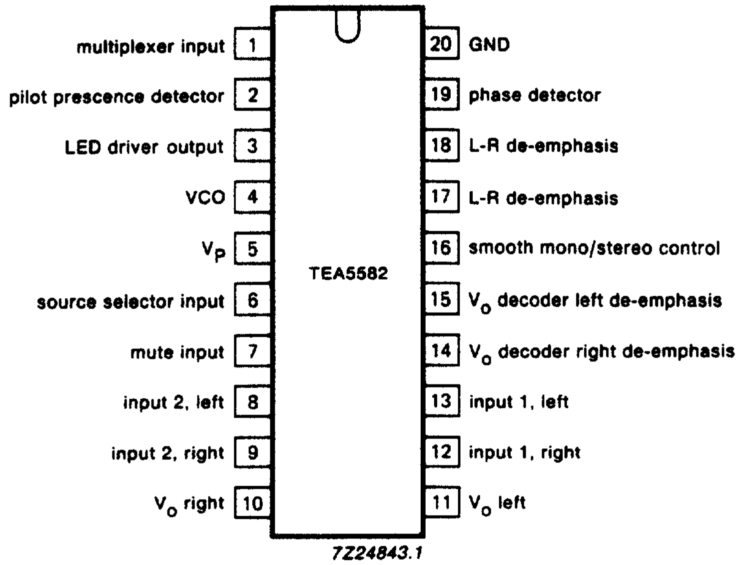


Fig.2 Pinning diagram.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

PARAMETER	SYMBOL	MIN.	MAX.	UNIT
Supply voltage range (pin 5)	V_P	–	18	V
LED-driver current (peak value)	I_3	–	75	mA
Total power dissipation	P_{tot}	see Fig.3		
Storage temperature range	T_{stg}	–65	+150	°C
Operating ambient temperature range	T_{amb}	0	+70	°C
Electrostatic handling(1)	V_{es}	–2	+2	kV

Note

1. ESD withstand voltage is defined by MIL STD 883C (C = 100 pF; R = 1.5 kΩ).

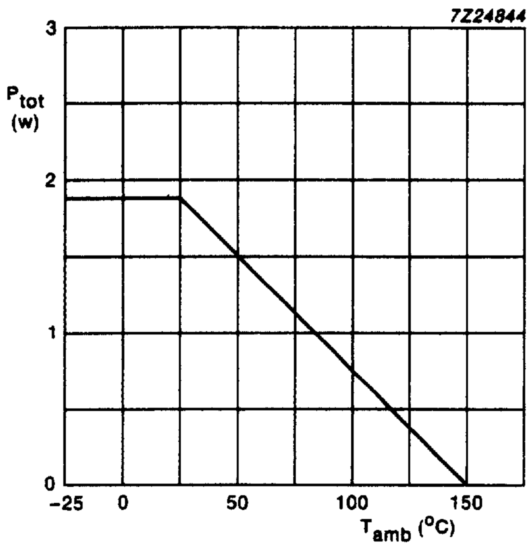


Fig.3 Power derating curve.

DC CHARACTERISTICS

All voltages are with respect to ground (pin 20); all currents are positive into the device; all parameters are measured in the test set-up (see Fig.5) at a nominal supply voltage of V_S = 8.5 V; T_{amb} = 25 °C unless otherwise specified.

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Supply voltage		V_S	7.0	8.5	16	V
Total current consumption	without LED driver	I_{tot}	–	19	25	mA
Power dissipation		P_{tot}	–	160	–	mW
Voltage						
pin 1		V_1	–	2.1	–	V
pins 8, 9, 10, 11, 12 and 13		$V_8 – V_{13}$	–	4.2	–	V
DC output current						
pins 14 and 15		$–I_{14}$, I_{15}	1.1	1.4	1.8	mA
LED-driver current						
pin 3		I_3	–	–	20	mA
Switch “VCO-OFF”						
voltage	I_{19} = 50 µA	V_{19}	–	2	–	V
Switch “VCO-OFF”						
current		I_{19}	50	–	–	µA

AC CHARACTERISTICS

Measured in the test circuit of Fig.5; V_S = 8.5 V; T_{amb} = 25 °C.
AC conditions: (1) input signal (V_i) of 815 mV p-p for L = 1, R = 1 (mono) f_m = 1 kHz (= 80% modulation). (2) MUX input signal (V_i) of 1.2 V p-p for L = 1, R = 0 and no DBX; f_m = 1 kHz (stereo) and V_{pilot} = 200 mV p-p. (3) S1 open, unless specified (without L–R filter); voltage controlled oscillator (VCO) adjusted to 188.8 kHz at V_i = 0 V; values are measured with an external IF roll-off network (–2 dB at 31.5 kHz = $2f_H$) at the input (dashed components RS and CS in Fig.5).
All the above conditions apply unless otherwise specified.

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Overall performance (V_i to V_o)						
Input current (RMS value)		$I_{I(rms)}$	–	–	12	μA
Overall gain	mono; R1 = 47 kΩ	G_o (V_o/V_i)	4	5.8	7	dB
AF output voltage (mono) (RMS value)		$V_{11} = V_{10}$	460	560	640	mV
AF output voltage (mono) (RMS value)		$V_{15} = V_{14}$	–	245	–	mV
Total harmonic distortion	note 1	THD	–	0.3	0.5	%
Output voltage	THD = 1%	$V_{11} = V_{10}$	–	800	–	mV
Output channel unbalance		$\lvert V_{11}/V_{10} \rvert$	–	0.1	1	dB
Channel separation	L = 1; R = 0	α	24	28	–	dB
Signal-to-noise ratio	bandwidth 20 Hz to 16 kHz	S/N	–	76	–	dB
	bandwidth IEC 79 (curve Din A)	S/N	–	82	–	dB
Pilot presence detector	note 2					
Switching to:						
stereo		V_{pilot}	–	40	60	mV
mono		V_{pilot}	15	30	–	mV
hysteresis		ΔV_{pilot}	–	2.5	–	dB
Smooth mono/stereo control (pin 16)	see Fig.4					
Channel separation (α)						
Full stereo	$V_{16} \geq 1.25$ V	α	24	28	–	dB
Smooth operation	V_{16} = typ. 1 V	α	–	10	–	dB
Full mono	$V_{16} \leq 0.75$ V	α	–	–	1	dB

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
Attenuation (L-R)			–	6	–	dB
Carrier and harmonic suppression at the output	note 3					
Pilot signal suppression	f_{pilot} = 15.734 kHz (1 fH)	αfH	32	36	–	dB
Subcarrier suppression						
f = 2 fH		α2fH	–	60	–	dB
VCO suppression						
f = 12fH		α12fH	–	75	–	dB
SAP signal suppression						
(Second Audio Programme) f = 5fH		α5fH	–	60	–	dB
Intermodulation suppression	note 4					
f_m = 8.367 kHz	spurious signal f_s = 1 kHz	α2	–	60	–	dB
f_m = 10.823 kHz	spurious signal f_s = 1 kHz	α3	–	70	–	dB
Ripple rejection	f = 120 Hz; V_{ripple} = 100 mV; mono	RR_{120}	–	50	–	dB
VCO						
R adjust (R5)	f_{OSC} = 188.808 kHz R7 = 10 kΩ 5% C6 = 820 pF 1%	R_{adj}	0	–	8	kΩ
Capture range	deviation from f_{OSC} centre frequency; V_{pilot} = 200 mV p-p	Δf/f	–	4.5	–	%
Temperature coefficient	uncompensated	TC	–	250×10^{-6}	–	K^{-1}
Output amplifiers						
Gain						
MUX signal		G_v	6.7	7.2	7.7	dB
external signal		G_v	–0.5	0	+0.5	dB
Input impedance		Z_i	–	50	–	kΩ
Output impedance		Z_o	–	10	–	Ω
External load impedance		Z_1	10	–	–	kΩ
External load capacitance		Z_1	–	–	1.5	nF
Mute suppression	$V_7 \leq 0.8$ V					
MUX signal		α	56	60	–	dB
external signal		α	56	60	–	dB

PARAMETER	CONDITIONS	SYMBOL	MIN.	TYP.	MAX.	UNIT
DC offset voltage at outputs	mute OFF-to-ON	ΔV	–	10	50	mV
	mute ON-to-OFF	ΔV	–	10	50	mV
Source selector (pin 6)						
Suppression of MUX signal	$V_6 \geq 2$ V	α	80	90	–	dB
Suppression of external signal	$V_6 \leq 0.8$ V	α	56	60	–	dB
Switching level	MUX selected					
voltage		V_{IL}	–	–	0.8	V
current	$V_I = 0.8$ V	I_{IL}	–	10	25	μA
Switching level	external selected					
voltage		V_{IH}	2	–	V_P	V
current	$V_I = V_P$	I_{IH}	–	0.1	1	μA
Muting circuit (pin 7)						
Input voltage	mute ON	V_{IL}	–	–	0.8	V
	mute OFF	V_{IH}	2	–	V_P	V
Input current	mute ON; $V_{IL} = 0.8$ V	$-I_{IL}$	–	10	25	μA
	mute OFF; $V_{IH} = V_P$	I_{IL}	–	0.1	1	μA

Notes

1. Guaranteed for mono, mono + pilot and stereo.
2. Adjustable.
3. S1 closed; reference: AF output voltage f = 1 kHz (mono).
4. Intermodulation suppression (Beat-Frequency Components (BFC)):

$$\alpha_2 = \frac{V_{o\,(signal)}\ (\text{at 1 kHz})}{V_{o\,(spurious)}\ (\text{at 1 kHz})};\ f_s = (2 \times 8.367\ \text{kHz}) - fH$$

$$\alpha_3 = \frac{V_{o\,(signal)}\ (\text{at 1 kHz})}{V_{o\,(spurious)}\ (\text{at 1 kHz})};\ f_s = (3 \times 10.823\ \text{kHz}) - 2fH$$

measured with 100% modulated input signal: L = R; pilot signal = 200 mV p-p; f_m = 8.367 or 10.823 kHz.

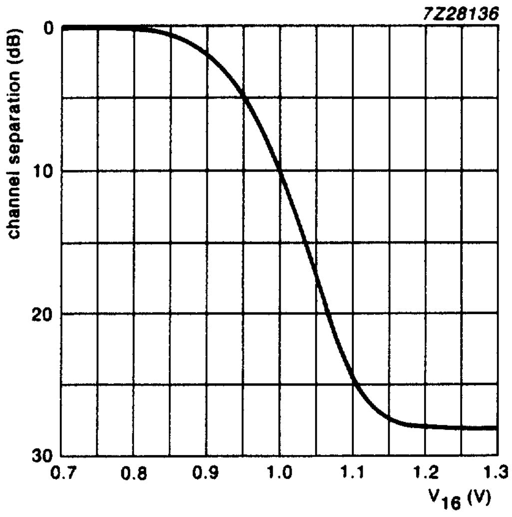


Fig.4 Smooth mono/stereo control.

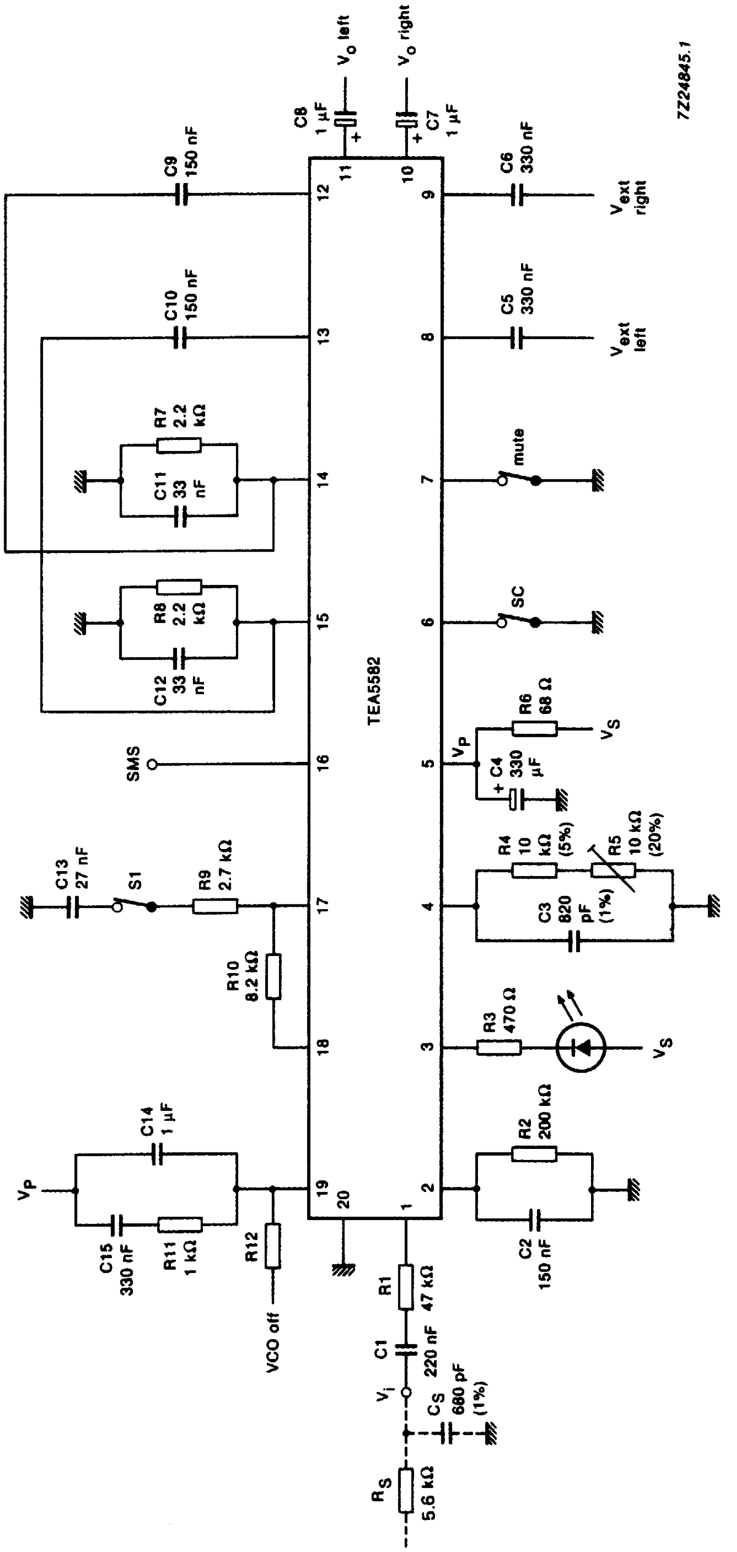
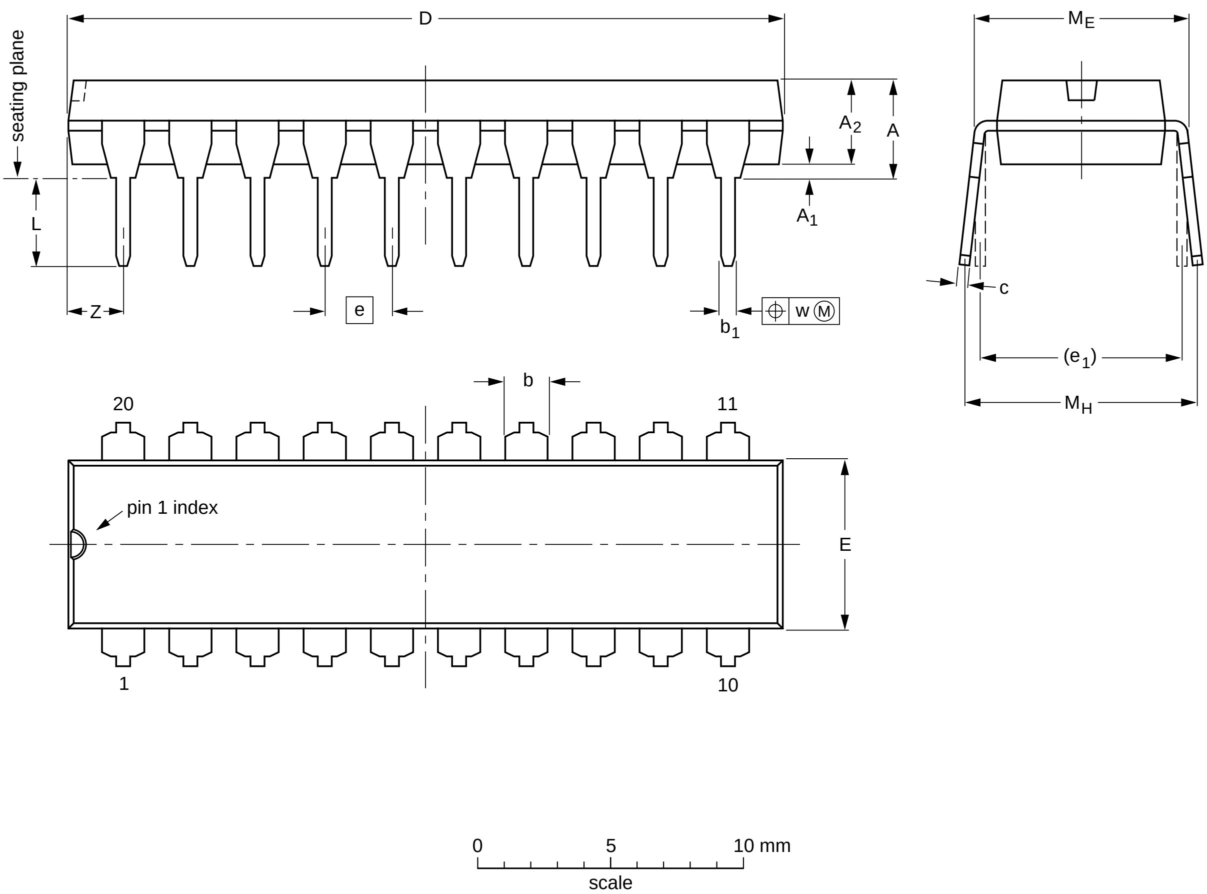


Fig.5 Test and application circuit.

PACKAGE OUTLINE

DIP20: plastic dual in-line package; 20 leads (300 mil) **SOT146-1**



DIMENSIONS (inch dimensions are derived from the original mm dimensions)

UNIT	A max.	A_1 min.	A_2 max.	b	b_1	c	D (1)	E (1)	e	e_1	L	M_E	M_H	w	Z (1) max.
mm	4.2	0.51	3.2	1.73 1.30	0.53 0.38	0.36 0.23	26.92 26.54	6.40 6.22	2.54	7.62	3.60 3.05	8.25 7.80	10.0 8.3	0.254	2.0
inches	0.17	0.020	0.13	0.068 0.051	0.021 0.015	0.014 0.009	1.060 1.045	0.25 0.24	0.10	0.30	0.14 0.12	0.32 0.31	0.39 0.33	0.01	0.078

Note

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOT146-1			SC603			~~92-11-17~~ 95-05-24

SOLDERING

Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *"IC Package Databook"* (order code 9398 652 90011).

Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg\ max}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.